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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/369,767	08/06/99	NEUMANN H	10191/1146

IM52/0103

KENYON & KENYON
ONE BROADWAY
NEW YORK NY 10004

EXAMINER	
OLSEN, K	
ART UNIT	**PAPER NUMBER**
1744	7

DATE MAILED: 01/03/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.	Applicant(s)
09/369,767	Neumann
Examiner	**Group Art Unit**
Kaj Olsen	1744

☒ Responsive to communication(s) filed on *Jan 20, 2000*

☒ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire *3* month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) *1-13* is/are pending in the applicat

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) *1-13* is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☒ The proposed drawing correction, filed on *Oct 20, 2000* is ☒ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☒ None of the CERTIFIED copies of the priority documents have been

☒ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 2-4, 9, and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 does not specify what the negative operating voltage is utilized for with respect to claim 1. Applicant's amendment to the claim still does not address the examiner's concern. Applicant should specify that the negative operating voltage is being applied to the negatively polarized electrode. In addition, the amended claim 2 has no antecedent basis for the new term "heater voltage".

In claim 4, the examiner is still unclear what is meant by the circuit arrangement "analyzing a negative probe voltage" because the applicant still has not explained the use of the term nor substantively amended the claim language.

Claims 9 and 12 set forth the presence of a reference duct, but do not sufficiently define the presence of this duct with respect to the other elements of the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 5-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato et al (4,909,922).

Kato discloses an electrochemical sensor comprising a solid electrolyte element including a first electrode 22, a second electrode 24 in the reference duct 72, and a heating element 36 where the second electrode is situated closer to the heating element than the first electrode (fig. 7). In addition, Kato discloses in the embodiment of fig. 7 coupling the second electrode to the lower potential terminal of the heater element. Fig. 7 also shows the second electrode extending over the width of the reference duct. Although the lower potential element is not specified as being ground, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize ground for the negative terminal of the heater because the ground potential is a convenient lower potential. Because the second electrode is grounded (as would have been obvious to do) and the first electrode would be at a lower potential than the second electrode due to the electromotive force induced by the difference in oxygen partial pressure between the reference and exhaust gas, said first electrode would inherently be negatively polarized. With respect to the size of the first and second electrodes, it would have

been obvious to one of ordinary skill in the art at the time the invention was being made to make the electrodes to be the same size such that only one mask would be needed for the deposition of the electrodes to the respective laminate faces during manufacturing thereby simplifying sensor construction. With respect to the electrolyte material, see (col. 10, lines 39-44). With respect to the heater voltage, although Kato ('922) does not explicitly specify the heater voltage applied, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize 12 volts since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). The heater is also disclosed as being embedded in an electrical insulator (col. 8, lines 25 and 26).

5. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kato ('922) in view of Logothetis et al ("High-temperature Oxygen Sensors", ACS Symposium Series)

Kato disclosed all the limitations of the claims, but did not explicitly recite the use of operating voltages for the electrodes. Kato instead disclosed utilizing the sensor for the measurement of the induced electromotive force. Logothetis discloses that there are a number of advantages to operating the sensor with an induced current (as opposed to relying on the electromotive force), including that the output of the sensor becomes linearly proportional to the oxygen concentration in the gas (fig. 1, 2 and the associated discussion). This allows for wide sensing range (electromotive based sensors are typical only sensitive at a particular air-fuel ratio) and it would have been obvious to one of ordinary skill in the art at the time the invention was

being made to utilize the teachings of Logothetis for the invention of Kato to provide a sensor giving an output linearly proportional to the measured gas concentration. The utilization of an impressed current would result in the application of a negative voltage to the first electrode because Kato already rendered obvious grounding the second electrode. With respect to the limitations calling for the second electrode to "additionally acts as a shield against coupling of heater voltage Uh", this limitation does not positively recite any further structure associated with sensor. Because the reference rendered obvious the structure of the claim, this shielding property is inherent.

6. Claims 1, 7, 8, 10, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stahl et al (4,400,260).

Stahl discloses an electrochemical sensor which comprises a solid electrolyte element 25 with first and second electrodes (27, 29 respectively), a heating element 30, where the second electrode 29 is situated closer to the heating element that the first electrode (fig. 4 and 5). Stahl also discloses connecting the second electrode 29 to a common element 33 with the negative lead of the heater. Although Stahl never discloses the common element to be at a ground potential, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize ground because ground is a convenient potential available in the application of these electrochemical sensors (see rejection with Kato above). With respect to the polarization level of the first electrode, Stahl discloses operating the sensor in potentiometric mode (col.3, lines 11 and 12). In such an application, the polarization of the first electrode will be a function

of the difference in oxygen levels in the gas being measured and in the reference passage. If the oxygen were greater in the measured portion than in the reference passage, the first electrode would be inherently negatively polarized. Because the claim does not specify an operating condition where the measured gas concentration is less than the reference gas composition, Stahl would inherently meet the polarization limitation when the measured gas is of a greater concentration than the reference gas. The electrolyte of Stahl is zirconia (col. 3, line 13) and the heating element is placed on a protective coating (col. 5, lines 66-67). With respect to the heater voltage, although Stahl does not explicitly specify the heater voltage applied, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize 12 volts since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). With respect to the limitations calling for the second electrode to "additionally acts as a shield against coupling of heater voltage Uh", this limitation does not positively recite any further structure associated with sensor. Because the reference rendered obvious the structure of the claim, this shielding property is inherent.

7. Claims 1-10, 12, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murase et al (5,413,683).

Murase discloses an electrochemical sensor which comprises a solid electrolyte element 14 which includes a first electrode 32, a second electrode 30. Although not shown in the figures, Murase further discloses the use of a heating means for operating the sensor at elevated

temperatures (col. 12, lines 32-35). Murase does not explicitly identify where the heating means would be located on the disclosed sensor, but it would have been obvious to one of ordinary skill in the art at the time the invention was being made to place the heating means at either the top of the sensor shown in fig. 1 or at the bottom because heaters are typically placed on the extreme side of the sensors (see any of the enclosed art as example). Placing the heater at the bottom of the sensor in fig. 1 would have advantages over placing the heater at the top because placing the heater at the bottom would not interfere any of the electrodes (electrode 32 needs to remain exposed to the exhaust gas). In this case, the second electrode 30 would be situated closer to the heating element than the first electrode. In addition, Murase teaches coupling the second electrode to ground while negatively polarizing the first electrode by the application of a negative voltage with respect to ground. The negative voltage provided to the first electrode controls (powers) the measuring circuit (fig. 3 and associated discussion). The first and second electrodes have approximately the same sizes and the second electrode communicates with an atmosphere 16 which would read on the applicants use of the term "reference duct" giving the term it broadest reasonable interpretation. With respect to the atmosphere being a reference atmosphere, the claim has not sufficiently defined the term reference in the claim in a manner which would obviate the examiner from interpreting said atmosphere as being a reference atmosphere.
With respect to the choice of electrolyte, see col. 6, lines 14-15. With respect to the heater voltage, although Murase et al does not explicitly specify the heater voltage applied, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to

utilize 12 volts since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). With respect to the limitations calling for the second electrode to "additionally acts as a shield against coupling of heater voltage Uh", this limitation does not positively recite any further structure associated with sensor. Because the reference rendered obvious the structure of the claim, this shielding property is inherent.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murase ('683) in view of Kato ('922).

Murase rendered obvious all the limitations of the claim, but did not explicitly recite the embedding of the heater element in an insulating layer. However, the previous utilized reference Kato taught embedding the heater into an insulating member. Said insulation lessens the heater current from interfering with sensing operation. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the insulation layer as taught by Kato for the sensor of Murase to keep the heater and electrodes more electrically isolated from each other.

Response to Arguments

9. Applicant's arguments filed on 10-20-2000 have been fully considered but they are not persuasive. Applicant urges that each reference utilized by the examiner fails to teach all the elements of the claim. However, in each case, the examiner does not understand the basis for

this argument. With respect to the use of the reference Kato ('922), applicant argues the reference teaches connecting the ground element of the heater to the measuring electrode. Applicant refers the examiner to fig. 1 and 2 (and disclosure directed to fig. 1 and 2). However, the examiner clearly was utilizing the embodiment shown in fig. 7 which shows the relationship as required for the rejected claims. Applicant also argues that the reference fails to teach the first electrode to be negatively polarized. However, examiner addressed why the first electrode is inherently negatively polarized in this, and the previous, office action. Applicant has not pointed out any reasons (with respect the utilized embodiment of fig. 7) why the applicant believes the examiner was in error with his reasoning. Applicant also argues the reference does not teach the electrodes to be "coacting". How the electrodes of the instant invention are any more coacting than the electrodes of Kato is unclear. The term "coacting" doesn't provide any further structure and cannot be the basis for any patentable distinction. Clarification as to why the reference does not meet the limitations of the rejected claims is required.

With respect to the examiner's use of the reference Logothetis, applicant argues that Logothetis fails to teach a number of features of the claimed invention including the use of a heating element. However, Logothetis is only being utilized for the obviousness between the use of sensors for electromotive force measurement and limit current measurements. The primary reference (Kato) already rendered obvious the heating element and all limitations except for the voltage source so this argument would appear to be immaterial. Clarification as to why the utilized combination fails to teach the limitations of the rejected claims is required.

With respect to the reference Stahl, applicant again argues that the reference fails to teach the use of coacting electrodes where the first electrode is negatively polarized. Again, the examiner is the office action explained both why, and under what conditions, said first electrode of Stahl would be negatively polarized. Applicant merely argues the reference does not teach it without providing any reasons why they believe the examiner is in error with his arguments. If the applicant believes the examiner is in error, it is the applicant's responsibility to provide *specific reasons* the rejection on record is improper. Clarification is required.

With respect to the reference Murase, applicant points out a number of differences between the sensor of Murase and the instant invention. The examiner recognizes the sensors do in fact differ is structure and operation. However, Murase reads on the invention *as claimed.* Applicant has not provided any specific reasons why Murase as utilized fails to read on the claims. With respect to that heater, applicant argues that the external heating means could be a furnace. However, this sensors intended use is as a air-fuel sensor for an automobile and the heating element could not be a furnace. Moreover, the examiner clearly set forth that any of the art of record sets forth typical heating elements utilized for sensors in the art. Clarification as to how Murase fails to render obvious the claimed invention is also required.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (703) 305-0506.

If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Mr. Robert Warden, can be reached at (703) 308-2920.

When filing a fax in Group 1700, please indicate in the header "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communications with the PTO that are not for entry into the file of this application. This will expedite processing of your papers. The fax number for this Group is (703) 305-7719.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, whose telephone number is (703) 308-0661.

Kaj K. Olsen, Ph.D.

Patent Examiner

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